

INTRA-SERVICE BIOLOGICAL OPINION

for

**U.S. Fish & Wildlife Service's Issuance of a Section 10 Permit
to ABR, Inc.**

for

**Studies on the North Slope and Cook Inlet Involving
Spectacled and Steller's eiders**

May 2011

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1. INTRODUCTION

This document is the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) on the issuance of a Section 10 permit under the Endangered Species Act for ABR, Inc.'s on-going survey work across the North Slope and Cook Inlet for spectacled and Steller's eiders. The purpose of the permitted studies is to increase our understanding of the range and distribution of these species. Little is known about nesting behavior in relation to disturbance from construction and oil field activities. As oil field development expands into new areas within the range of these listed species it is important to have data that will assist in setting appropriate limits, and developing work practices in the future. Data from the Cook Inlet study will provide important baseline data on wintering populations of Steller's eiders that will be key in minimizing effects from a proposed development project.

This BO describes the effects of these actions on threatened spectacled (*Somateria fischeri*) and Steller's (*Polysticta stelleri*) eiders, and polar bears (*Ursus maritimus*) and polar bear critical habitat pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

After reviewing the information provided, the status of the species, the environmental baseline, and cumulative effects, the Service concludes that the proposed activities may adversely affect listed eiders but will not jeopardize their continued existence. No adverse effects to polar bears or polar bear critical habitat are anticipated. However, since there is the possibility of encountering a polar bear, the project participants will abide by Polar Bear Interaction Guidelines (Appendix A) developed to ensure the permitted activities are conducted in a manner that avoids conflict between polar bears and humans. As a result of agreement to follow the guidelines, no adverse impacts to this species are anticipated.

Project details were received on 2 May 2011. Formal consultation began on 3 May 2011. The complete administrative record of this consultation is on file at the Service's Fairbanks Field Office.

In summary, surveys for spectacled and Steller's eider will be conducted in Northern Alaska in the Kuparuk Oilfield, on the Colville River Delta, in the National Petroleum Reserve – Alaska (NPRA), and near Barrow. Surveys for Steller's eiders will also be conducted in lower Cook Inlet.

In general, the North Slope studies have similar objectives. Aerial surveys will be conducted to locate breeding pairs and determine the relative abundance and distribution of eiders in specific study areas. Ground-based surveys entail intensive searches of suitable habitat to locate breeding pairs (road surveys) and to locate nests and determine nesting success, whenever possible. This information will be used by ABR's clients for planning developments, monitoring construction impacts, developing clean-up strategies, and avoiding disturbance at eider nests, and is added to their databases for additional natural resource inventory and permit requirements.

The helicopter-based surveys in lower Cook Inlet are baseline studies to determine the seasonal distribution and abundance of nonbreeding Steller's Eiders in the vicinity of a proposed port site for a proposed mine.

Section 7(a)(2) of the Act states that Federal agencies must ensure their activities are not likely to:

- Jeopardize the continued existence of any listed species; or
- Result in the destruction or adverse modification of designated critical habitat.

After reviewing the information provided, the status of the species, the environmental baseline, and cumulative effects, the Service concludes that the issuance of a section 10 permit for the proposed activities may adversely affect listed eiders but will not jeopardize listed eider species or adversely modify critical habitat. The Service has determined that it is unlikely that the action will violate section 7(a)(2) of the Act. To arrive at this non-jeopardy determination, we used a four-step approach for applying section 7(a)(2) standards. These steps were:

1. Define the biological requirements and current status of spectacled and Steller's eiders;
2. Evaluate the relevance of the environmental baseline to the current status of spectacled and Steller's eider populations;
3. Determine the effects of the proposed or continuing action on the species; and
4. Determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages.

In addition to listed eiders, Alaska's North Slope may now or hereafter contain plants or animals determined to be threatened or endangered, or their habitats. The Service, through future consultation may recommend alternatives to future developments within this area to prevent activity that will contribute to a need to list such a species or designate critical habitat. The Service may require alternatives to proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of designated or proposed critical habitat. The Service should not approve any activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended (16 U.S.C. 1531 et seq.), including completion of any required procedure for conference or consultation.

2. DESCRIPTION OF THE PROPOSED ACTION

2.1 Background

Section 7(a)(2) of Act requires that Federal agencies shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat. When the actions of a Federal agency may adversely

affect a protected species, that agency (i.e., the action agency) is required to consult with either the National Marine Fisheries Service (NMFS) or the Service, depending upon the protected species that may be affected.

For the actions described in this document, the action agency is the Region 7 Fisheries and Ecological Services Office (Endangered Species Program) of the U.S. Fish and Wildlife Service. This office is issuing a section 10 permit to ABR Inc. for survey work across the North Slope and at Cook Inlet. The permit issuance is the federal nexus for consultation. This consultation is being conducted as an intra-service consultation with the Endangered Species Branch of the Fairbanks Fish and Wildlife Field Office.

2.2 Action Area

The action area is that area in which the direct and indirect effects of the proposed action may occur. The proposed studies will take place in a number of discrete geographic areas on the North Slope and in Cook Inlet:

1. Kupuruk Oilfields
2. Colville River Delta - ground-based survey work will concentrate around the CD-3 development.
3. National Petroleum Reserve – Alaska - study areas are west of Alpine and Nuiqsut and north to the Beaufort Sea coast in the Fish Creek delta area.
4. Barrow - Aerial surveys in USGS Quads Barrow and Meade River from Ikpiuk River to Peard Bay, south to Meade River.
5. Lower Cook Inlet

2.3 Project Action

This BO describes and evaluates three groups of actions that will occur as a result of the proposed project:

- Ground-based surveys for spectacled and Steller's eiders;
- Aerial surveys (fixed-wing) for spectacled eiders and Steller's eiders; and
- Aerial surveys (helicopter-based) for Steller's eiders.

Ground-based Surveys

Kuparuk Oilfield

Road surveys will be conducted from approximately June 3 – 19 to locate pre-nesting males and pairs. Ground-based searches for spectacled eider nests will be conducted at locations based on observations of pre-nesting pairs, and at previous years nest sites. As in past years, ABR, Inc. will place up to 3 digital video cameras to monitor spectacled eider nests and insert up to 10 thermistored eggs in spectacled eider nests to monitor incubation constancy. Improved cameras with larger memory cards will be used that will not need to be collected until the nest-fate checks in early July, which eliminates disturbance of nesting eiders after the initial installation. Thermistors do not need to be checked until after nest hatch.

Ground-based searches for Spectacled Eider nests will also be conducted at the Sharktooth drill pad located in the Tarn area of the Kuparuk River Unit. Searches will be conducted within 400 m (200 m on each side) of the proposed pad location and along 1–5 proposed road

routes (varying from 3.2 to 7 km long). Active nests of Spectacled Eiders will be marked with survey lath and coordinates recorded so the nests can be revisited to check their fate at the end of nesting.

Colville River Delta

Ground-based searches for spectacled eider nests will be conducted within 200 m of the CD-3 footprint, at Alaska Clean Seas equipment deployment sites, and along the ice-road from Alpine to CD-3. Nest searches will occur between the last week of June and first week of July to find all active and inactive eider nests prior to activities by clean-up and deployment crews at these sites. CPAI environmental staff will be informed of any spectacled eider nest locations so that active nest sites can be avoided by oilfield workers. Up to 10 active nests will receive thermistors to monitor incubation, and thermistors will be retrieved in mid-July after nesting is complete.

Aerial surveys (fixed-wing)

Fixed-wing aerial surveys will be conducted in mid June to locate possible breeding pairs of Spectacled and Steller's eiders in the Kuparuk Oilfield, on the Colville River Delta, in the NPRA, and in the Barrow area. Methods are generally similar among all the surveys. For most surveys, two observers in a Cessna 185 (or comparable aircraft) record all eiders seen from the aircraft along east-west oriented strip transects of fixed width (200 m on each side of the aircraft). Transects are spaced at various distances depending on coverage and all surveys are flown 30–50 m above ground level at a speed of approximately 145 km/hr. Although birds sometimes flush during these surveys, they generally circle and land again (duration less than 1 minute). The survey plane moves quickly through the area and the disturbance is a single, transitory event.

Aerial surveys (Helicopter-based)

In lower Cook Inlet, aerial surveys for Steller's eiders (under this permit), northern sea otters (under USFWS Permit #MA187053-0), and other marine mammals (under NOAA Letter of Confirmation for the General Authorization #14227 will be flown in up to 19 survey periods (with up to 2 replicates per survey period) by helicopter, at an altitude of ~ 160 m above sea level and a speed of 80-130 km/h, once or twice per month during June–December 2011 and January–May 2012. When possible, an initial high-level (180-230 m) overflight will be conducted to detect Steller's eider flocks in commonly-used areas. Subsequently, to reduce disturbance, ABR, Inc. will try to maintain the greatest possible distance from Steller's eiders and traverse the area without circling or hovering. However, some level of disturbance may still occur. Judging from past surveys, up to 700 Steller's Eiders could occur in the study bays (Iniskin and Iliamna bays) during the winter months, so up to 700 birds conceivably could be disturbed during each replicate survey. Although Steller's Eiders have reacted to some past surveys, those reactions have been brief, consisting of flushing, circling, and landing again (duration about 1 minute or less).

Results will provide baseline data in the area of potential port construction for the proposed Pebble Mine Project.

3. STATUS OF THE SPECIES AND CRITICAL HABITAT

This section presents biological and ecological information relevant to formation of the BO. Appropriate information on the species' life history, habitat and distribution, and other factors necessary for their survival is included for analysis in later sections.

3.1 Spectacled Eider

Physical Appearance

Spectacled eiders are large sea ducks. Males in breeding plumage have a white back, black breast, and pale green head with large white "spectacles" around the eyes. In late summer and autumn males molt into a mottled brown plumage that lasts until late fall, when they re-acquire breeding plumage. Females are mottled brown year round, with pale tan spectacles. Juveniles attain breeding plumage in their second (female) or third (male) year; until then they are mottled brown (Petersen et al. 2000). Both males and females have long sloped bills, giving them a characteristic profile (Figure 3.1).



M. Breaks/USFWS

Figure 3.1 - Male and female spectacled eiders in breeding plumage.

Status and Distribution

Spectacled eiders inhabit the North Pacific. There are three primary breeding populations; those on Alaska's North Slope, the Y-K Delta, and northern Russia. Historically, spectacled eiders nested in Alaska discontinuously from the Nushagak Peninsula north to Barrow, and east nearly to Canada's Yukon Territory (Phillips 1922-1926, Bent 1925, Bailey 1948, Dau and Kistchinski 1977, Derksen et al. 1981, Garner and Reynolds 1986, Johnson and Herter 1989). The entire species was listed throughout its range as threatened on May 10, 1993 (USFWS 1993) because of documented population declines. The Y-K Delta population had declined 96% between the 1970s and early 1990s (Stehn et al. 1993, Ely et al. 1994), and anecdotal information indicated that populations in the other two primary breeding areas had also declined (USFWS 1996).

Research and spring aerial surveys have provided data on spectacled eider populations on Alaska's ACP (the North Slope breeding population) since 1992. On the North Slope, spectacled eiders breed north of a line connecting the mouth of the Utukok River to a point on the Shaviovik River about 24 km (~15 miles) inland from its mouth. Breeding density varies across the North Slope (Figure 3.2). Breeding pair numbers peak in mid-June and the number of males declines 4-5 days later (Smith et al. 1994, Anderson and Cooper 1994, Anderson et al. 1995, Bart and Earnst 2005).

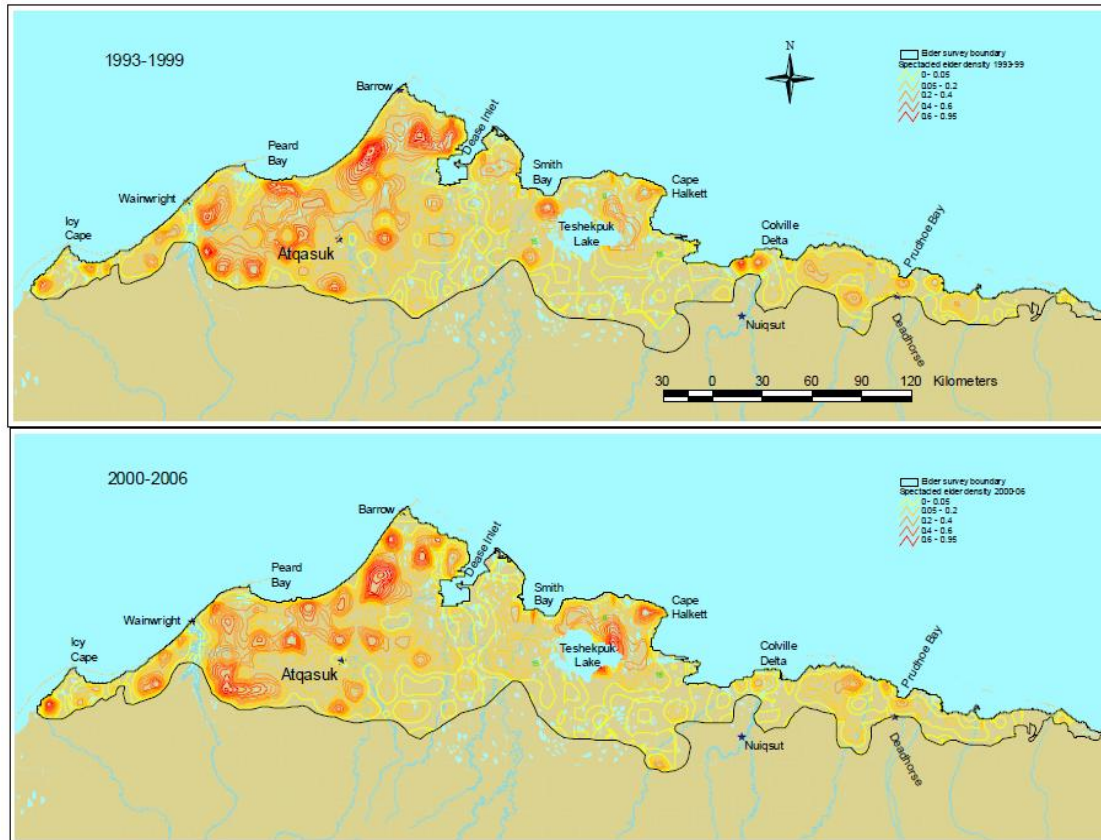


Figure 3.2 – Mean spectacled eider breeding density across Alaska's Arctic Coastal Plain 1993-1999 above and 2000 – 2006 below (from Larned et al. 2006).

North Slope spectacled eider clutch size averages 3.2-3.8, with clutches of up to eight eggs reported (Quakenbush et al. 1995). Incubation lasts 20-25 days (Kondratev and Zadorina 1992, Harwood and Moran 1993, Moran and Harwood 1994, Moran 1995), and hatching occurs from mid- to late July (Warnock and Troy 1992). On the nesting grounds, spectacled eiders feed on mollusks, insect larvae (craneflies and caddisflies), midges, small freshwater crustaceans, and plants and seeds (Kondratev and Zadorina 1992) in shallow freshwater or brackish ponds, or on flooded tundra. Young fledge approximately 50 days after hatch, and then females with broods move directly from freshwater to marine habitats.

Nest success is highly variable and greatly influenced by predators, including gulls (*Larus* spp.), jaegers (*Stercorarius* spp.), and red (*Vulpes vulpes*) and arctic (*Alopex lagopus*) foxes. In Arctic Russia, apparent nest success was calculated as <2% in 1994

and 27% in 1995; predation was believed to be the cause of high failure rates, with foxes, gulls and jaegers the suspected predators (Pearce et al. 1998). On Kigigak Island in the Y-K Delta, Mayfield nest success ranged from 6-92% from 1992-2007 (Lake 2007). Nest success tended to be higher in years with low fox numbers or activity (i.e., no denning) and when foxes were eliminated from the island prior to the nesting season or years. Apparent nest success in 1991 and 1993-1995 in the Kuparuk and Prudhoe Bay oil fields on the North Slope varied from 25-40% (Warnock and Troy 1992, Anderson et al. 1998). On the Colville River Delta, in the vicinity of the proposed project, average Mayfield nest success from 1994-1999 was 31% (Bart and Earnst 2005). Duckling survival is also variable and influenced by predators. Radio telemetry studies of broods on the Y-K Delta have reported duckling survival to 30 days averaging 34-45% on the Kashunuk River (Flint and Grand 1997, Flint et al. 2006) and 67% at Kigigak Island (Flint et al. 2006).

As with other sea ducks, spectacled eiders spend the 8-10 month-long non-breeding season at sea, but until recently much about the species' life in the marine environment was unknown. Satellite telemetry and aerial surveys led to the discovery of spectacled eider migrating, molting, and wintering areas at sea. These studies are summarized in Petersen et al. (1995), Larned et al. (1995), and Petersen et al. (1999).

Spectacled eiders molt in several discrete areas (Figure 3.3), with birds from the different populations and genders apparently favoring different molting areas (Petersen et al. 1999). After molting, spectacled eiders migrate to openings in pack ice of the central Bering Sea south/southwest of St. Lawrence Island (Petersen et al. 1999; Figure 3.2), where they remain until March and April (Lovvorn et al. 2003).

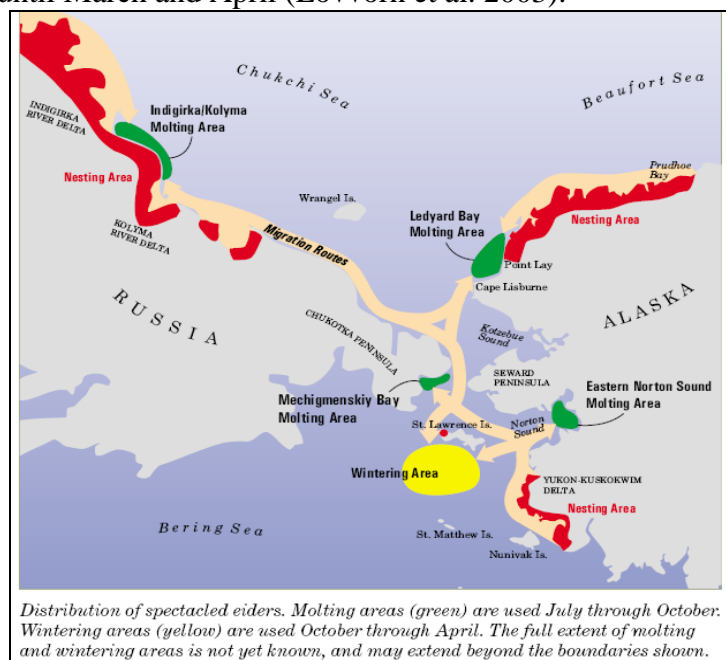


Figure 3.3 - Distribution of spectacled eiders.

Male spectacled eiders begin to depart breeding areas during incubation, which is during late June on the North Slope. On the North Slope, pair numbers peak in mid-June and the

number of males declines 4-5 days later (Smith et al. 1994, Anderson and Cooper 1994, Anderson et al. 1995). Following their late June departure from the nesting areas, males apparently make little use of the Beaufort before migrating to the Chukchi Sea. During late June the Beaufort Sea has little open water, hence males present at breeding grounds east of Barrow normally do not use marine habitats and fly directly overland (most heading to a molting/staging area in Ledyard Bay) (TERA 2003). Later in the season (late June through September), when females depart the North Slope, much more of the nearshore zone is ice-free. Open water in marine habitat allows for extensive use of the western Beaufort Sea. Radio telemetry studies have shown that most female spectacled eiders that migrate west toward Barrow use the near shore zone of the Beaufort Sea as they transit to their molting/staging areas. In 2000, 13 female spectacled eiders tracked via radio telemetry primarily used the western Beaufort (71% of all bird-days) while areas near Stockton Island were also extensively used (17% of all bird-days) (TERA 2003). The females remained in the Beaufort Sea near shore zone for an average of about two weeks (range 6-30 days). After molting, spectacled eiders migrate offshore in the Chukchi and Bering Seas to a single wintering area in openings in pack ice of the central Bering Sea south/southwest of St. Lawrence Island (Petersen et al. 1999). Spectacled eiders in the marine environment feed predominately on clams and small amounts of snails, amphipods, and other bivalves.

Spectacled Eider Abundance and Trends

The most recent rangewide estimate of the total number of spectacled eiders was 363,000 (333,526-392,532 95% CI), obtained by aerial surveys of the known wintering area in the Bering Sea in late winter 1996-1997 (Petersen et al. 1999). Winter/Spring aerial surveys were repeated in 2009 and 2010. Preliminary results from 2009 indicate an estimate of 301,812 spectacled eiders, but this value will be updated when surveys from both years are analyzed (Larned et al. 2009).

No population estimates for the North Slope breeding population are available before 1993. At Prudhoe Bay, within the North Slope breeding area, Warnock and Troy (1992) documented an 80% decline in spectacled eider abundance from 1981 until 1991. For the North Slope breeding population, ground-plot surveys have not been conducted. The 2009 population index based on aerial surveys was 5,018 birds (3343-6692, 90% CI; Larned et al. 2010). The North Slope spectacled eider population from 1993-2009 was slightly decreasing, with an average (n = 17 years) population growth rate of 0.985 (0.971, 0.999, 90% CI; Larned et al. 2010). The North Slope breeding population estimate for 2007-2009 (adjusted for detection probability = 46%) was 12,506 (9,365–15,646, 90% C.I.)

Spectacled Eider Recovery Goals and Status

The Spectacled Eider Recovery Plan (USFWS 1996) presents research and management priorities with the objective of recovery and delisting so that protection under the Act is no longer required. Although the cause or causes of the spectacled eider population decline is not known, factors that affect adult survival are likely to be the most influential on population growth rate. These include lead poisoning from ingested spent shotgun pellets, which may have contributed to the rapid decline observed in the Y-K Delta

(Franson et al 1995, Grand et al. 1998), and other factors such as habitat loss, increased nest predation, over harvest, and disturbance and collisions caused by human infrastructure (factors discussed in Section 4 – *Environmental Baseline*). Under the Recovery Plan, the species will be considered recovered when each of the three recognized populations (Y-K Delta, North Slope of Alaska, and Arctic Russia): 1) is stable or increasing over 10 or more years and the minimum estimated population size is at least 6,000 breeding pairs, or 2) number at least 10,000 breeding pairs over 3 or more years, or 3) number at least 25,000 breeding pairs in one year. Spectacled eiders do not currently meet these recovery criteria.

Spectacled Eider Critical Habitat

Critical habitat for molting spectacled eiders was designated in Norton Sound and Ledyard Bay molting areas, nesting areas on the Y-K Delta, and the wintering area southwest of St. Lawrence Island (critical habitat was not designated on the ACP; 66 CFR 9146 [February 6, 2001]) .

3.2 Steller's Eider

Physical Appearance

The Steller's eider is the smallest of the four eider species. From early winter until mid-summer males are in breeding plumage - black back, white shoulders and sides, chestnut breast, white head with black eye patches and a greenish tuft (Figure 3.4). During late summer and fall, males molt to dark brown with a white-bordered blue wing speculum; this plumage is replaced during the autumn molt when males re-acquire breeding plumage, which lasts through the next summer. Females are dark mottled brown with a blue wing speculum year round. Juveniles are dark mottled brown until the fall of their second year, when they acquire breeding plumage (Fredrickson 2001).



Figure 3.4 - Male and female Steller's eider in breeding plumage.

Status and Distribution

The Steller's eider is a circumpolar sea duck. Steller's eiders are divided into Atlantic and Pacific populations; the Pacific population is further divided into the Russia-breeding population along the Russian eastern arctic coastal plain, and the Alaska-breeding population.

On June 11, 1997, the Alaska-breeding population of Steller's eiders was listed as threatened based on a substantial decrease in this population's breeding range and the increased vulnerability of the remaining Alaska-breeding population to extirpation (USFWS 1997). Although population size estimates for the Alaska-breeding population were imprecise, it was clear Steller's eiders had essentially disappeared as a breeding species from the Yukon-Kuskokwim Delta (Y-K Delta), where they had historically occurred in significant numbers, and that their Arctic Coastal Plain (North Slope) breeding range was much reduced. On the North Slope they historically occurred east to the Canada border (Brooks 1915), but have not been observed on the eastern North Slope in recent decades (USFWS 2002). The Alaska-breeding population of Steller's eiders now nests primarily on the North Slope, particularly near Barrow and at very low densities from Wainwright to at least as far east as Prudhoe Bay (Figure 3.5). A few pairs may still nest on the Y-K Delta; only 10 Steller's eider nests have been recorded on the Y-K Delta since 1970 (Hollmen et al. 2007).

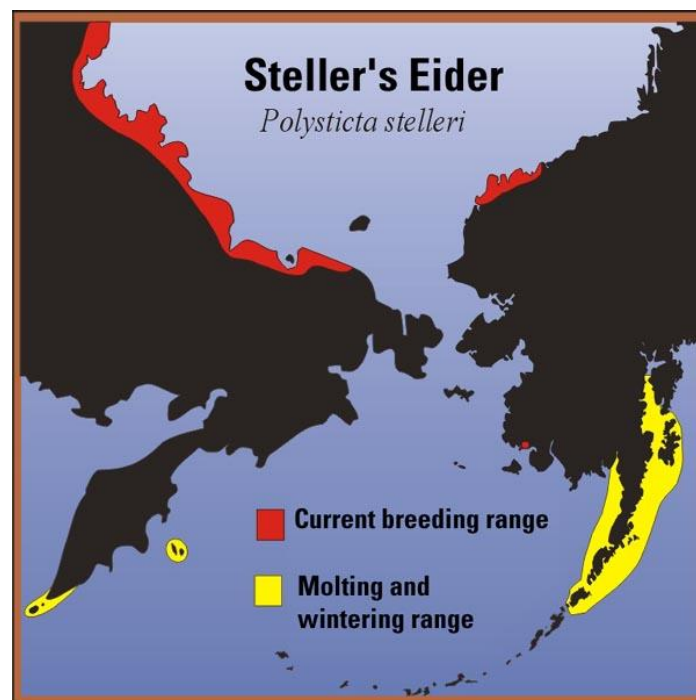


Figure 3.5 - Steller's eider distribution in the Bering, Beaufort and Chukchi seas (USFWS 2002b).

Steller's eiders arrive in pairs on Alaska's North Slope in early June, but nests are only found intermittently near Barrow since 1991. Nests of Steller's eiders have been found near Barrow in 12 (60%) of the last 20 years. (USFWS, unpublished data). Individuals foregoing breeding is common in long-lived eider species and is typically related to inadequate body condition (Coulson 1984), but reasons for Steller's eiders non-breeding may be more complex. In the Barrow area, Steller's eider nesting is correlated with lemming numbers and other environmental cues; nest success could be enhanced in years of lemming abundance because nest predators are less likely to prey-switch to eider eggs and young, or because avian predators such as pomarine jaegers (*Stercorarius*

pomarinus) and snowy owls (*Bubo scandiaca*) that nest nearby (and consume abundant lemmings) may protect eider nests from mammalian predators such as arctic fox (Quakenbush and Suydam 1999, and summarized by Rojek 2006).

When they do nest, Alaska-breeding Steller's eiders use coastal tundra adjacent to small ponds or within drained lake basins, occasionally as far as 90 km inland. Nests are initiated in the first half of June (Quakenbush et al. 1995), and hatching occurs from July 7 to August 3 (Quakenbush et al. 1998). Nests located in the vicinity of Barrow were in wet tundra, in drained lake basins or low-center or low indistinct flat-centered polygon areas (Quakenbush et al. 1998). Average clutch sizes at Barrow varied from 5.3-6.3, with clutches of up to 8 reported (Quakenbush et al. 1998). Nest survival (the probability a nest will hatch at least one egg) averaged 0.23 in nesting years (1991-2004) prior to fox control, whereas nest survival during nesting years after fox control began (2005-2010) was 0.48 (USFWS, unpublished data).

Within a day or two after hatch, hens move their broods to adjacent ponds with emergent vegetation, particularly *Carex* spp. and *Arctophila fulva* (Quakenbush et al. 1998, Rojek 2006, 2007). Here they feed on insect larvae and other wetland invertebrates. Broods may move up to several kilometers from the nest prior to fledging (Quakenbush et al. 1998, Rojek 2006, 2007). Fledging occurs from 32-37 days post hatch (Obritschkewitsch et al. 2001, Quakenbush et al. 2004, Rojek 2006).

Information on breeding site fidelity of Steller's eiders is limited. However, some information is available from the breeding ecology study at Barrow. Since the mid 1990s, five birds that were originally captured as confirmed nesters near Barrow were recaptured in subsequent years nesting near Barrow. The time between capture events ranged from 1 to 12 years and the distance between nests ranged from 0.1 to 6.3 km.

Departure from the breeding grounds differs between sexes and between breeding and non-breeding years. Male Steller's eiders typically leave the breeding grounds after females begin incubating, around the end of June or early July (Quakenbush et al. 1995, and Obritschkewitsch et al. 2001). Females whose nests fail may remain near Barrow later in summer; a single failed-breeding female equipped with a transmitter in 2000 remained near the breeding site until the end of July and stayed in the Beaufort Sea off Barrow until late August (Martin et al. in prep). Successfully-breeding females and fledged young depart the breeding grounds in early to mid-September. In a non-breeding year, satellite-transmitted males and females dispersed across the area between Wainwright and Admiralty Inlet in late June and early July, with most birds entering marine waters by the first week of July. They were tracked at coastal locations from Barrow to Cape Lisburne, and made extensive use of lagoons and bays on the north coast of Chukotka (Martin et al. in prep.).

After the breeding season, Steller's eiders move to marine waters where they undergo a complete flightless molt for about 3 weeks. The combined (Russia- and Alaska-breeding) Pacific population molts in numerous locations in southwest Alaska, with exceptional concentrations in four areas along the north side of the Alaska Peninsula:

Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands (Gill et al. 1981, Petersen 1981, Metzner 1993). Molting areas are characterized by extensive shallow eelgrass (*Zostera marina*) beds and intertidal sand flats and mudflats, where Steller's eiders forage on marine invertebrates such as mollusks and crustaceans (Petersen 1980, 1981; Metzner 1993).

After molt, many of the Pacific-wintering population of Steller's eiders disperse to winter in the eastern Aleutian Islands, the south side of the Alaskan Peninsula, and east to Cook Inlet, although thousands may remain in lagoons used for molt unless or until freezing conditions force them to move (USFWS 2002). Wintering Steller's eiders usually (although not always; Martin et al. in prep.) occur in waters less than 10 m deep, which are normally within 400 m of shore or at offshore shallows. The listed Alaska-breeding population is only a small proportion of the Pacific-wintering population of Steller's eiders, approximately 0.7%. This estimate is derived by taking the most recent North Slope breeding bird estimate of 576 birds (described below, Stehn and Platte, 2009), adding 1 for the YKD population, and then dividing by the population estimate of Pacific-wintering Steller's eiders from 2007 (87,400; Larned 2007). Thus, $576 \div 87,400 = (0.00659 * 100) = 0.7\%$ or rounded to 1%.

Prior to spring migration, thousands of Steller's eiders stage in estuaries along the north side of the Alaska Peninsula, including some molting lagoons, and at the Kuskokwim Shoals near the mouth of the Kuskokwim River in late May (Larned 2007, Martin et al. in prep.). Like other eiders, Steller's eider may use spring leads for feeding and resting, but there are few conclusive data about habitat use during spring migration. It seems likely Steller's eiders are also using the Chukchi lead system similarly to king eiders (Steffen Oppel, University of Alaska-Fairbanks, unpublished data).

During winter, Steller's eiders generally use and feed in shallower water than the other eider species, although they may also use deeper (20-30 m) habitats if feeding on water-column invertebrates (Philip Martin, USFWS, pers. comm.). They are likely associated with shallow spring leads, therefore, although they possibly also use leads in deeper water if an abundant and nutritious invertebrate community is present in the water column. Alaska-breeding Steller's eiders typically return to breeding areas near Barrow in early June (Rojek 2006).

Steller's Eider Abundance and Trends – Pacific Population

The majority of the world population of Steller's eiders migrates along the Bristol Bay coast of the Alaska Peninsula in the spring, where they linger en route to feed at the mouths of lagoons and other productive habitats. Annual spring aerial surveys have been conducted since 1992 to monitor the population status and habitat use of Steller's eiders (*Polysticta stelleri*) staging for spring migration in southwestern Alaska. Annual Steller's eider estimates ranged from 137,904 (1992) to 54,888 (2010), mean 73,904. The long-term trend indicates an exponential decline of 2.7 percent per year ($R^2=0.43$; Larned and Bollinger, 2010). Larned and Bollinger (2010) suggest that a slight negative trend bias may have resulted from a higher frequency of optimally-timed counts in early years due to free selection from among survey replicates, compared to the single annual counts in subsequent

years. A variable low-bias may also be present in most annual estimates due to inaccuracies in timing, observer effects and other uncontrolled variables (Larned and Bollinger 2010).

Steller's Eider Abundance and Trends – Listed Alaska-Breeding

The listed Alaska-breeding population is only a small proportion of the Pacific-wintering population of Steller's eiders, approximately 0.8%. This estimate is derived by taking the most recent North Slope breeding bird estimate of 576 birds (described below, Stehn and Platte, 2009), adding 1 for the YKD population, and then dividing by the population estimate of Pacific-wintering Steller's eiders from 2010 (73,904; Larned and Bollinger 2010). Thus, $577 \div 73,904 = 0.8\%$ or rounded to 1%.

Stehn and Platte (2009) conducted a review of the distribution, abundance, and trends of the listed population of Steller's eiders on the arctic coastal plain (ACP). Using data from three aerial surveys, (the ACP, the North Slope eider survey [NSE], and the Barrow Triangle survey [ABR]), they assessed population status and trends of the Steller's eider population nesting on the ACP of Alaska. Data reported from these three surveys provide different estimates of average population size and trend. The 1989-2006 ACP survey (Mallek et al. 2007) estimated a total average population size of 866 birds with a declining population growth rate of 0.778 (Stehn and Platte 2009); the NSE survey (1992-2008; Larned et al. 2009) averaged 162 birds with increasing growth rate of 1.059. The ABR survey, which surveys only the Barrow triangle, which is a subset of the larger ACP and NSE survey areas (1999-2007; Obrishkewitsch et al. 2008) averaged 100 birds with a growth rate of 0.934. Average population size and trend can be biased by changes in observer, detection rates and survey timing. Survey timing was considered especially important for species with male departure early in incubation, or other marked shifts in habitat use, movements, or flocking behavior (ground breeding surveys near Barrow indicate the best time for aerial surveys of breeding Steller's eiders is about 12-20 June, after arrival of most breeding individuals but before most males depart. Using a subset of data least confounded by changes in survey timing and observer, the appropriately-timed NSE survey observations from 1993-2008 averaged 173 indicated total Steller's eiders (88-258, 90% confidence interval) with an estimated growth rate of 1.011 (0.857 – 1.193, 90% CI). The authors assumed a detection probability of 30% (based upon reasonable estimates with similar species and habitats), yielding a total average population of Steller's eiders breeding in the ACP of about 576 (292-859, 90% CI; Stehn and Platte 2009).

Standardized ground surveys for eiders near Barrow have been conducted since 1999, and have found an average density near Barrow of 0.63 birds/ km² (Rojek 2008). The Barrow vicinity supports the largest known concentration of nesting Steller's eiders in Alaska. The highest number of Steller's eiders observed during systematic surveys at Barrow occurred in 1999 with 135 males counted during ground surveys (36 nests found); in 2008, 114 male Steller's eiders were counted during ground surveys (28 nests found). Counts of males are the most reliable indicator of Steller's eider presences because females are cryptic and are often undercounted. Approximately 90% of all Steller's eiders nests found near Barrow since 1991 were within one mile of the Barrow

road network (1991-2007 locations are summarized in Rojek 2008; 2008 locations are USFWS, unpublished data).

Recovery Criteria

The Steller's Eider Recovery Plan (USFWS 2002) presents research and management priorities, that are re-evaluated and adjusted every year, with the objective of recovery and delisting so that protection under the Act is no longer required. When the Alaska-breeding population was listed as threatened, factors causing the decline were unknown, but possible causes identified were increased predation, over hunting, ingestion of spent lead shot in wetlands, and habitat loss from development. Since listing, other potential threats have been identified, including exposure to other contaminants, scientific research, and climate change but causes of decline and obstacles to recovery remain poorly understood.

Criteria used to determine when species are recovered are often based on historical abundance and distribution, or on the number needed to ensure the risk of extinction is tolerably low (with extinction risk estimated by population modeling). For Steller's eiders, information on historical abundance is lacking, and demographic parameters needed for accurate population modeling are poorly understood. Therefore, the Recovery Plan for Steller's eiders establishes interim recovery criteria based on extinction risk, with the assumption that numeric population goals will be developed as demographic parameters become better understood. Under the Recovery Plan, the Alaska-breeding population would be considered for reclassification to endangered if the population has $\geq 20\%$ probability of extinction in the next 100 years for 3 consecutive years, or the population has $\geq 20\%$ probability of extinction in the next 100 years and is decreasing in abundance. The Alaska-breeding population would be considered for delisting from threatened status if it has $\leq 1\%$ probability of extinction in the next 100 years, and each of the northern and western subpopulations are stable or increasing and have $\leq 10\%$ probability of extinction in 100 years.

Steller's Eider Critical Habitat

In 2001, the Service designated 2,830 mi² (7,330 km²) of critical habitat for the Alaska-breeding population of Steller's eiders at breeding areas on the Y- K Delta, a molting and staging area in the Kuskokwim Shoals, and molting areas in marine waters at Seal Islands, Nelson Lagoon, and Izembek Lagoon (66 FR 8849, February 2, 2001). No critical habitat for Steller's eiders has been designated on the ACP. In accordance with section 3(5)(A)(i) of the Act and regulations in 50 C.F.R. 424.12, critical habitat for a species contains those physical or biological features that are essential for the conservation of the species and which may require special management considerations and protection. Under the Act these features are considered "primary constituent elements" of critical habitat, and include, but are not limited to: space for individual and population growth, and for normal behavior; food, water air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and habitats that are

protected from disturbance or are representative of the historical geographic and ecological distribution of a species.

3.3 Polar Bears

Due to threats to its sea ice habitat, on May 15, 2008 the Service published a Final Rule in the Federal Register listing the world-wide population of the polar bear (*Ursus maritimus*) as threatened (73 FR 28212) under the ESA. Because we are consulting informally on polar bears we are not including a full status description in this consultation. A description of their status can be found in the BO for the *Issuance of Marine Mammal Research Permit MA046081-3* dated February 24, 2011.

Polar Bear Critical Habitat

The Service designated polar bear critical habitat on November 24, 2010 (75 FR 76086). The PCEs of critical habitat for the polar bear are:

- 1) **Sea-ice habitat** used for feeding, breeding, denning, and movements, which is sea ice over waters 300 m (984.2 ft) or less in depth that occurs over the continental shelf with adequate prey resources (primarily ringed and bearded seals) to support polar bears.
- 2) **Terrestrial denning habitat**, which includes topographic features, such as coastal bluffs and river banks, with the following suitable macrohabitat characteristics:
 - a) Steep, stable slopes (range 15.5–50.0), with heights ranging from 1.3 to 34 m (4.3 to 111.6 ft), and with water or relatively level ground below the slope and relatively flat terrain above the slope;
 - b) Unobstructed, undisturbed access between den sites and the coast;
 - c) Sea ice in proximity to terrestrial denning habitat prior to the onset of denning during the fall to provide access to terrestrial den sites; and
 - d) The absence of disturbance from humans and human activities that might attract other polar bears.
- 3) **Barrier island habitat** used for denning, refuge from human disturbance, and movements along the coast to access maternal den and optimal feeding habitat, which includes all barrier islands along the Alaska coast and their associated spits, within the range of the polar bear in the United States, and the water, ice, and terrestrial habitat within 1.6 km (1 mi) of these islands (no-disturbance zone).

Critical habitat does not include manmade structures (e.g., houses, gravel roads, generator plants, sewage treatment plants, hotels, docks, seawalls, pipelines) and the land on which they are located existing within the boundaries of designated critical habitat on the effective date of this rule.

4. ENVIRONMENTAL BASELINE

The environmental baseline is the current status of listed species and their habitats, and critical habitat, as a result of past and ongoing human and natural factors in the area of

the proposed action. Also included in the environmental baseline are the anticipated impacts of other proposed Federal projects in the action area that have already undergone formal section 7 consultation.

Spectacled and Steller's Eiders

Spectacled and Steller's eiders are present on the North Slope in the project action areas from late May through September. The Lower Cook Inlet project is not within the known range of spectacled eiders and is on the edge of the wintering/molting range of Steller's eiders. Both species have undergone significant, unexplained declines in their Alaska-breeding populations. Factors that may have contributed to the current status of spectacled and Steller's eiders are discussed below and include, but are not limited to, toxic contamination of habitat, increase in predation, over harvest, and habitat loss through development and disturbance. Recovery efforts for both species are underway in portions of the action area.

Toxic Contamination of Habitat

The deposit of lead shot in tundra or nearshore habitats used for foraging is a threat for spectacled and Steller's eiders. Lead poisoning of spectacled eiders has been documented on the YKD (Franson et al. 1995, Grand et al. 1998) and Steller's eiders on the ACP (Trust et al. 1997; Service unpublished data). Female Steller's eiders nesting at Barrow in 1999 had blood lead concentrations that reflected exposure to lead (>0.2 ppm lead), and six of the seven tested had blood lead concentrations that indicated poisoning (>0.6 ppm lead) (Pattee and Pain 2003). Additional lead isotope tests confirmed the lead in the Steller's eider blood was of lead shot origin, rather than natural sources such as sediments (Matz, USFWS, unpublished data). A juvenile Steller's eider, found shot dead at Barrow in 2008, also had a single ingested lead pellet in its gizzard, indicating spent lead shot is still available to migratory birds that feed in that environment (Matz, USFWS, pers. comm.). However, the Service is encouraged by much recent progress in the decreasing use of lead shot, especially on the North Slope (use of lead shot for hunting waterfowl is prohibited statewide, and for hunting all birds on the North Slope). Hunter outreach programs are ongoing to reduce any continuing use of lead shot in waterfowl nesting areas, and the Service reports good compliance in most areas with the lead shot prohibitions.

Water birds in arctic regions are also exposed to global contamination, including radiation, industrial, and agricultural chemicals that can be transported by atmospheric and marine transport. Twenty male spectacled eiders wintering near St. Lawrence Island examined for the presence and effects of contaminants apparently were in good condition, but had high concentrations of metals and subtle biochemical changes that may have long term effects (Trust et al. 2000).

Increase in Predator Populations

It has been speculated that anthropogenic influences on predator populations or predation rates may have affected eider populations, but this has not been substantiated. Steller's eider studies at Barrow suggest that high predation rates explain poor breeding success

(Quakenbush et al. 1995, Obritschkewitsch et al. 2001). Researchers have proposed that reduced fox trapping, anthropogenic food sources in villages and oil fields, and nesting sites on human-built structures have increased fox, gull, and raven numbers (R. Suydam and D. Troy pers. comm., Day 1998), but the connection between these factors and increased predation rates has not been proven.

Over Harvest

Hunting for spectacled and Steller's eiders was closed in 1991 by Alaska State regulations and Service policy. Outreach efforts have been conducted by the North Slope Borough, BLM, and Service to encourage compliance. However, harvest data collected from the spring/summer subsistence hunts suggests that both Steller's and spectacled eiders are being taken during this hunt on the North Slope (Service data). Measures are being implemented to avoid and minimize the lethal take of listed eiders on the North Slope during the 2011 and subsequent spring/summer subsistence hunts.

Habitat Loss through Development and Disturbance

With the exception of contamination by lead shot, destruction or modification of North Slope nesting habitat of listed eiders has been limited to date, and is not thought to have played a major role in population declines of spectacled or Steller's eiders. Until recently eider breeding habitat on the ACP was largely unaltered by humans, but limited portions of each species' breeding habitat have been impacted by fill of wetlands, the presence of infrastructure that presents collision risk, and other types of human activity that may disturb birds or increase populations of nest predators. These impacts have resulted from the gradual expansion of villages, coupled with cold war era military developments such as the Distant Early Warning (DEW) Line sites at Cape Lonely and Cape Simpson (*circa* 1957), and, more recently, the initiation and expansion of oil development since construction of the Prudhoe Bay field and Trans Alaska Pipeline System (TAPS) in the 1970s.

The population of communities such as Barrow has been increasing, and BLM (2007) expects growth to continue at approximately 2% per annum until at least the middle of this century. Assuming community infrastructure and footprint grow at roughly the same pace as population, BLM (2007) estimates that community footprint could cover 3,600 acres by the 2040s. Oil and gas development has steadily moved westward across the ACP towards NPR-A since the initial discovery and development of oil on the North Slope. Given industries interest in NPR-A, as expressed in lease sales, seismic surveys, and drilling of exploratory wells, the westward expansion of industrial development is likely to continue. Scientific, field-based research is also increasing on the ACP as interest in climate change and impacts to high latitude areas continues.

Scientific, field-based research is also increasing on the ACP as interest in climate change and its effects on high latitude areas continues. While many of these activities have no impacts on listed eiders as they occur in seasons when eiders are absent from the area, or use remote sensing tools, on-the-ground activities and tundra aircraft landings likely disturb a small number of listed eiders each year. Many of these activities are considered

in intra-Service consultations, or under a programmatic consultation with BLM for summer activities in NPR-A.

Incidental Take

Recent activities across the North Slope that required formal section 7 consultation, and the estimated incidental take of listed eiders, is presented in Table 4.1. These actions were considered in the final jeopardy analysis of this biological opinion. It should be noted that incidental take is estimated prior to the implementation of reasonable and prudent measures and associated terms and conditions which serve to reduce the levels of incidental take. Further, in some cases included in this table, estimated take is likely to occur over the life of the project (often 30–50 years) rather than annually or during single years reducing the severity of the impact to the population. There are also important differences in the type of incidental take. The majority of the incidental take estimated is a loss of eggs/ducklings, which is of much lower significance for survival and recovery of the species than the death of an adult bird. For example, spectacled eider nest success recorded on the Y-K Delta ranged from 18-73% (Grand and Flint 1997), and average clutch size was 5 eggs (Petersen et al. 1999). From the nests that survived to hatch, spectacled eider duckling survival to 30-days ranged from 25-47% on the Y-K Delta (Flint et al. 2000). Over-winter survival of one-year old spectacled eiders was estimated at 25% (P. Flint pers. comm.), with annual adult survival of 2-year old birds (that may enter the breeding population) of 80% (Grand et al. 1998). Using these data (in a very simplistic scenario) we estimate for every 100 spectacled eider nests on the Y-K Delta, less than 2 - 17 adult females would be expected to survive and enter (recruit) into the breeding population. Similarly, we expect that only a small proportion of spectacled and Steller's eider eggs or ducklings on the North Slope would eventually survive to recruit into the breeding population.

Table 4.1 illustrates the number and diversity of actions that required consultation in Alaska. We believe these estimates have overestimated, possibly significantly, actual take. Actual take is likely reduced by the implementation of terms and conditions in each biological opinion, is spread over the life-span of a project (often 50 years), and is dominated by the *potential* loss of eggs/ducklings which, as described above, is of less significance than adult mortality for survival and recovery of these K-selected species. Also, it remains unknown to what degree spectacled and Steller's eiders potentially affected by disturbance can reproduce in disturbed areas or move to other less disturbed areas to reproduce. If either or both occur, these factors also serve to reduce actual impacts from the maximal potential impacts.

Table 4.1 - Activities in Alaska that required formal section 7 consultation and the amount of incidental take provided.

Project Name	Impact Type	Estimated Incidental Take
False Pass Harbor (2001)	Contaminants	4 adult Steller's eiders
NPDES-GP (2001)	Collisions	1 adult Steller's eider
Chignik Lagoon Tank Farm (2001)	Contaminants	14 adult Steller's eiders
Chignik Dock (2002)	Contaminants	4 adult Steller's eiders

Chignik Bay Tank Farm (2002)	Contaminants	5 adult Steller's eiders
Sandpoint Harbor (2002)	Contaminants Collisions Habitat loss	13 adult Steller's eiders
Beaufort Sea Planning Area Lease Sale 186, 195, & 202 (2002)	Collisions	5 adult spectacled eiders 1 adult Steller's eider
Fairweather Seismic (2003)	Disturbance	66 adult Steller's eiders
Nelson Lagoon Tank Farm (2003)	Contaminants Collisions	21 adult Steller's eiders
Akutan Mooring Basin (2003)	Contaminants Collisions	10 adult Steller's eiders
Alpine Development Project (2004)	Habitat loss Collisions	4 spectacled eider eggs/ducklings 3 adult spectacled eiders
Barrow Airport Expansion (2006)	Habitat loss	14 spectacled eider eggs/ducklings 29 Steller's eider eggs/ducklings
Barrow Hospital (2004 & 2007)	Habitat loss	2 spectacled eider eggs/ducklings 17 Steller's eider eggs/ducklings
Barrow Landfill (2003)	Habitat loss	1 spectacled eider nest/ year 1 Steller's eider nest/year
Barrow Artificial Egg Incubation	Removal of eggs for captive breeding program	Maximum of 24 Steller's eider eggs
Barrow Tundra Manipulation Experiment (2005)	Habitat loss Collisions	2 spectacled eider eggs/ducklings 1 Steller's eider eggs/ducklings 2 adult spectacled eiders 2 adult Steller's eiders
Barrow Global Climate Change Research Facility, Phase I & II (2005 & 2007)	Habitat loss Collisions	6 spectacled eider eggs/ducklings 25 Steller's eider eggs/ducklings 1 adult spectacled eider 1 adult Steller's eider
Barrow Wastewater Treatment Facility (2005)	Habitat loss	3 Steller's eider eggs/ducklings 3 spectacled eider eggs/ducklings
Savoonga Wind Turbine (2005)	Collisions	1 adult spectacled eider
Chukchi Sea Lease Sale 193 (2007)	Collisions	3 adult spectacled eiders 1 adult Steller's eider
ABR Avian Research/USFWS Intra-Service Consultation	Disturbance	5 spectacled eider eggs/ducklings
Pioneer's Oooguruk Project	Habitat loss Collisions	3 spectacled eider eggs/ducklings 3 adult spectacled eiders
BP's 69Kv Powerline	Collisions	10 adult spectacled eiders over 50 years
BP's Liberty Project	Habitat loss Collisions	2 spectacled eider eggs/ducklings 1 adult spectacled eider
Intra-service on Subsistence Hunting Regulations 2007	No estimate of incidental take provided	
Intra-service on Subsistence Hunting Regulations 2008	No estimate of incidental take provided	
Intra-service on Subsistence Hunting Regulations 2009	No estimate of incidental take provided	
BP Alaska's Northstar Project	Collisions	≤ 2 adult spectacled eiders/year ≤ 1 adult Steller's eider/year
KMG Nikaitchuq Project	Habitat loss Collisions	2 spectacled eiders/year 7 adult spectacled eiders over 30 years

Akutan Transportation (2007)	Disturbance	20 adult Steller's eiders
Unalaska Harbor (2007)	Contaminants Collisions Habitat loss	3 adult Steller's eiders
Intra-Service Consultation 2007 on MBM Avian Influenza Sampling	Disturbance	6 spectacled eider eggs/ducklings
Goodnews Bay Processor (2008)	Disturbance	28 adult Steller's eiders
BLM 2007 Programmatic on Summer Activities in NPR-A	Disturbance	21 spectacled eider eggs/ducklings
BLM 2008 Programmatic on Summer Activities in NPR-A	Disturbance	56 spectacled eider eggs/ducklings
BLM 2009 Programmatic on Summer Activities in NPR-A	Disturbance	49 spectacled eider eggs/ducklings
BLM Northern Planning Areas of NPR-A (2008)	Disturbance Collision	87 spectacled eider eggs/ducklings/year 12 Steller's eider eggs/ducklings/year < 7 adult spectacled eiders < 1 adult Steller's eider
MBM/USFWS Intra-Service Consultation 2008	Disturbance	21 spectacled eider eggs/ducklings
NOAA National Weather Service Office in Barrow	Habitat loss Disturbance Collision	< 4 spectacled eider eggs/ducklings < 10 Steller's eider eggs/ducklings 1 adult Steller's eider
Intra-Service on Section 10 permit for Dr. Peterson's 2009 PTT project	Loss of Production Capture/surgery	130 spectacled eider eggs/ducklings 4 adult spectacled eiders
MMS Beaufort and Chukchi Sea Program Area Lease Sales (2009)	Collision	12 adult spectacled eiders <1 adult Steller's eider
Intra-Service, Migratory Bird 2010 Subsistence Hunting Regulations	No estimate of incidental take provided	
Intra-Service, Section 10 permit for Dr. Peterson's telemetry research on spectacled eider use of the the Chukchi and Beaufort Seas (2010)	Loss of Production Capture/handling/ surgery	130 spectacled eider eggs/ducklings 7 adult/juvenile spectacled eiders (lethal take) 108 adult/juvenile spectacled eiders (non-lethal take)
BLM programmatic for activities between June 5 and Oct 31, 2010	Disturbance	32 Spectacled eider eggs
Intra-Service, Migratory Bird Management goose banding on the North Slope of Alaska (2010)	Disturbance	4 spectacled eider eggs/ducklings
Intra-Service, Section 10 permit for USFWS eider survey work at Barrow (2010)	Disturbance Capture/handling	3 Steller's eider or spectacled eider clutches 90 pairs + 60 hens, Steller's eider 60 pairs + 60 hens, spectacled eider 1 Steller's eider or spectacled eider adult (lethal take) 7 ducklings Steller's eider or spectacled eider (lethal take) 30 Steller's eider or spectacled eider hens (nonlethal take) 40 Steller's eider or spectacled eider ducklings (nonlethal take)
Intra-Service, Section 10 permit for ABR Inc.'s eider survey work on the North Slope and at Cook Inlet (2010)	Disturbance	35 spectacled eider eggs/ducklings

Climate Change

High latitude regions, such as Alaska's North Slope, are thought to be especially sensitive to the effects of climate change (Quinlan et al. 2005, Schindler and Smol 2006, and Smol et al. 2005). While climate change will likely affect individual organisms and communities it is difficult to predict with any specificity how these effects will manifest. Biological, climatological, and hydrologic components of the ecosystem are interlinked and operate on multiple spatial, temporal, and organizational scales with feedback between the components (Hinzman et al. 2005).

There are a wide variety of changes occurring in the arctic worldwide, including Alaska's North Slope. Arctic landscapes are dominated by lakes and ponds (Quinlan et al. 2005), such as those used by listed eiders for feeding and brood rearing. In many areas these water bodies are drying out during the summer as a result of thawing permafrost (Smith et al. 2005 and Oechel et al. 1995), and increased evaporation and evapotranspiration as they are ice-free for longer periods (Schindler and Smol 2006, and Smol and Douglas 2007). Productivity of lakes and ponds appears to be increasing as a result of nutrient inputs from thawing soil and an increase in degree days (Quinlan et al. 2005, Smol et al. 2005, Hinzman et al. 2005, and Chapin et al. 1995). Changes in water chemistry and temperature are resulting in changes in the algal and invertebrate communities, which form the basis of the food web in these areas (Smol et al. 2005, Quinlan et al. 2005).

With the reduction in summer sea ice, the frequency and magnitude of coastal storm surges has increased. These often result in breaching of lakes and low lying coastal wetland areas killing salt intolerant plants and altering soil and water chemistry, and hence, the fauna and flora of the area (USGS 2006a). Historically sea ice has served to protect shorelines from erosion; however, this protection has decreased as sea ice has declined. Coupled with softer, partially thawed permafrost, the lack of sea ice has significantly increased coastal erosion rates (USGS 2006a), potentially reducing available coastal tundra habitat.

Changes in precipitation patterns, air and soil temperature, and water chemistry are also affecting tundra vegetation communities (Hinzman et al. 2005, Prowse et al. 2006, Chapin et al. 1995), and boreal species are expanding their range into tundra areas (Callaghan et al. 2004). Changes in the distribution of predators, parasites, and disease causing agents resulting from climate change may have significant effects on listed species and other arctic fauna and flora. Climate change may also result in mismatched timing of migration and the development of food in Arctic ponds (Callaghan et al. 2004), and changes in the population cycles of small mammals such as lemmings to which many other species, including nesting Steller's eiders (Quakenbush and Suydam 1999), are linked (Callaghan et al. 2004).

While the impacts of climate change on listed species in both the action area and marine environment that comprises the rest of their range are unclear, species with small

populations are vulnerable to environmental change (Crick 2004). Some species will increase in abundance and range with climate change, while others will suffer from reduced population size and range. The ultimate effects of climate change on listed eiders are undetermined at present.

Polar Bears

Polar bears can occur in the action area. Polar bears generally do not occur inland during the summer, but a slight possibility exists that field crews may encounter transient polar bears when working within a few miles of the coast. Polar bears can be found with a higher frequency during the summer and fall on barrier islands and along the mainland coast.

Polar Bear Critical Habitat

Much of the action area is within in the polar bear denning and barrier island critical habitat units. The action area also contains existing structures that are excluded from critical habitat.

5. EFFECTS OF THE ACTION ON LISTED SPECIES

This section of the biological opinion provides an analysis of the effects of the Action on listed species, and on critical habitat. Both direct effects (those immediately attributable to the Action), and indirect effects (those caused by the Action, but which will occur later in time, and are reasonably certain to occur) are considered. Finally, the effects from interrelated and interdependent activities are also considered. These effects will then be added to the environmental baseline in determining the proposed Action's effects to the species or its critical habitat (50 CFR Part 402.02).

Spectacled and Steller's Eiders

5.1 Beneficial effects

Beneficial effects are those effects of an action that are wholly positive, without any adverse effects, on a listed species or designated critical habitat. This project will have beneficial effects for the species, in that it will provide the Service and Eider Recovery Team with information that will better enable us to develop management actions to aid recovery.

5.2 Direct Effects

Issuance of the section 10 permit would allow activities that may adversely affect both listed eider species through disturbance. The proposed field activities will not occur within critical habitat; thus we conclude that the proposed activity will not adversely modify or destroy critical habitat.

Ground-based Surveys

Ground-based surveys for spectacled eiders will occur at the Kuparuk Oilfield, and the Colville River Delta. It is generally recognized among researchers that investigator disturbance can have a negative impact on waterfowl breeding success. During the pre-nesting period, courting activities and foraging efficiency and feeding times could be

impacted. During the nesting period, females may be flushed from nests, resulting in exposure of eggs or young ducklings to inclement weather and predators. Hens may damage eggs as they are flushed from a nest (Major 1989); and may abandon nests entirely, particularly if disturbance occurs early in the incubation period (Livezy 1980, Götmark and Ählund 1984).

While both avian and mammalian predators have been documented depredating nests after a hen has been flushed by humans, Götmark (1992) concluded that avian predators were more likely to depredate nests following disturbance. Grand and Flint (1997) suggested avian predators, particularly gulls, were more prevalent than mammalian predators on the Y-K Delta. Similar results were reported from studies in the area by Mickelson (1975) who attributed 85.9% of nest predation to avian predators, while Vacca and Handel (1988) attributed 78% of predation to avian predators. Given the similar fauna, vegetation, and terrain it is likely that avian predators would also be more significant than mammalian predators if nests are disturbed on the North Slope.

The effects of human disturbance may be reduced if predators are also disturbed and move away from the area. While some predators, such as corvids, appeared to negatively respond to humans and move away when disturbed, Götmark and Ählund (1984) noted a weak attraction to humans by gulls. In contrast Strang (1980), observed an attraction to humans from parasitic jaegers but not by gulls. It remains unclear how human presence will affect predator behavior in the action area.

In his review paper, Götmark (1992) concluded 76% of papers that showed decreased nest success as a result of disturbance attributed the reduction to predation and 34% to nest desertion. Mickelson (1975) suggested very low rates of desertion, 0.8% naturally with an additional 0.7% as a result of human disturbance, in his studies of cackling geese and spectacled eiders on the Y-K Delta. Data from the Y-K Delta indicates reductions in the daily spectacled eider nest survival rate of 4% (Bowman and Stehn 2003), and 14% (Grand and Flint 1997) due to disturbance.

In conclusion, the action could adversely affect individual Steller's and spectacled eiders through disturbance. For spectacled eiders, estimated disturbance at Kuparuk Oilfield is 35 nests during nest searches, and 10 nests during nesting for placement and service of time-lapse digital cameras and thermistored eggs and up to 10 nests may be disturbed at the Colville River Delta site during nest searches and implantation of thermistored eggs. Thus, a total of 55 nests may be disturbed by nest searching and implantation of thermistored eggs.

While the potential for eider egg loss or nest abandonment is low from nest searching and monitoring, it is not negligible. For the purposes of this BO, we are considering nest searches and placement of thermistored eggs to create the same probability of nest failure. However, not all flushes will result in a nest being abandoned or depredated. Data from the Y-K Delta indicates reductions in the daily spectacled eider nest survival rate of 4% (Bowman and Stehn 2003), and 14% (Grand and Flint 1997) due to disturbance. For the purposes of estimating incidental take in this BO, we use the midpoint in this range and estimate that 9% of all flushes will result in nest loss. Hence, the predicted 55 spectacled eider flush events will result in the loss of up to 5 nests.

Average clutch size for spectacled eiders in northern Alaska is 3.9 (Petersen et. al. 2000, Bart and Earnst 2005, Johnson et al. 2008). Using this figure, incidental take resulting from ground-based nest searches may be up to 3.9 eggs x 5 nests = 20 eggs.

Nesting Steller's eider hens may be disturbed (such as flushed during the course of nest searching and monitoring) while conducting nest searches for spectacled eiders. The estimated average density of Steller's eiders across the North Slope in 2009 was 0.002 Steller's eiders/km² or 0.001 nests/ km² (Larned et al. 2010). Given the low density of Steller's eider nests in the action area (site specific data not available), we estimate <1 Steller's eider nest would be impacted due to disturbance associated with nest searches and captures of spectacled eiders, and no loss of production is likely to result from proposed activities.

Aerial Surveys

Fixed-wing aerial surveys will be conducted to locate possible breeding pairs of spectacled and Steller's eiders in the Kuparuk Oilfield, on the Colville River Delta, in the NPRA, and in the Barrow area. Surveys are flown in a Cessna 185, 30-50 m above ground level at a speed of approximately 145km/hr. Although birds sometimes flush during these surveys, they generally circle and land again (duration less than 1 minute). The survey plane moves quickly through the area and the disturbance is a single, transitory event. Additionally, although difficult to quantify, it is reasonable to assume that birds in the direct flight path are more likely to flush than those farther away from the aircraft. Given that observers are recording observations at 200m on each side of the aircraft and that the majority of surveys are flown with transects spaced 800m apart (50% coverage) or 1600m apart (25% coverage), we presume that only a proportion of the total listed eiders in the survey area may be disturbed. Disturbance of non-nesting birds is unlikely to result in harassment or harm as defined by the ESA, whereas disturbance to incubating females may increase risk of nest abandonment or depredation. However, surveys are timed to occur at the pre-nesting stage, when only a small number of females will be incubating. In the unlikely event that an incubating female is flushed, the transitory nature of the disturbance presumably would not preclude the female's timely return to the nest. Therefore, given that: 1) surveys are transitory and will likely disturb listed eiders for a short period of time, after which they will resume normal behavior; 2) surveys are not expected to disturb all listed eiders in survey area; and 3) few if any incubating females will be disturbed, it is unlikely that disturbance from fixed wing aerial surveys will adversely affect listed eiders.

Helicopter surveys for Steller's eiders, northern sea otters, and other marine mammals will be flown in lower Cook Inlet. Aerial surveys will be flown in up to 19 survey periods (with up to 2 replicates per survey period) at an altitude of ~ 160 m above sea level and a speed of 80-130 km/h, once or twice per month during June–December 2011 and January–May 2012. When possible, an initial high-level (180-230 m) overflight will be conducted to detect Steller's eider flocks in commonly-used areas. Subsequently, to reduce disturbance, ABR, Inc. will try to maintain the greatest possible distance from Steller's eiders and traverse the area without circling or hovering. However, some level of disturbance may still occur. Judging from past surveys, up to 700 non-breeding Steller's eiders could occur in the study bays (Iniskin and Iliamna bays) during the winter months, so

up to 700 non-breeding or 7 listed eiders (~ 1% are Alaska-breeding) conceivably could be disturbed during each replicate survey in the winter.

Because of concerns about the effects of helicopter-caused disturbance to these birds, ABR, Inc. kept detailed notes about responses of Steller's eiders to the disturbance in 2009 and 2010. In some cases, researchers successfully avoided flushing Steller's eiders during the survey by conducting an initial high-level (180–230 m) overflight of the study area to detect flocks in commonly-used areas; they subsequently maintained higher altitudes (>180 m) in areas with flocks, maintained the greatest distance possible from Steller's eiders that still allowed estimation of flock size, and traversed the area without circling or hovering. However, Steller's eiders sometimes flushed before they were detected, from distances as great as 1.5 km and with helicopter altitudes as high as 230 m asl. Birds that flushed generally were arranged in loose flocks that were strung out over a substantial area, and flushing brought them together into a tight single-species flock. The common response of birds that were farther away from the main group was to fly toward birds that were more closely compacted. Once the flock aggregated, the birds were less prone to flush again, even when the helicopter passed within 0.25–0.5 km. In every case in which they were able to observe the entire flushing event, the duration of flight after flushing was < 60 seconds and usually lasted < 30 seconds.

In summary, helicopter-based surveys are unlikely to constitute a significant physiological impact to the individuals affected. The following information led us to this conclusion:

- 1.) During helicopter surveys, ABR, Inc. will conduct overflights when possible, reducing the likelihood of a flushing response.
- 2.) In the event that Steller's eiders are flushed, the response will be short term, and not likely to significantly disrupt normal behavior patterns (feeding and resting) such that it would affect their energy budget.
- 3.) Birds that are close together tend to not flush and swim towards each other, whereas birds farther from the core of the flock may fly back toward the core, thus reducing displacement from their resting and feeding grounds.
- 4.) Once the flock is reunited in a tight group, they are less likely to flush a second time.
- 5.) The total duration of the flushing flight response is usually < 30 seconds.
- 6.) Only ~1% of Steller's eiders in Cook Inlet are considered listed eiders.

Therefore, the Service believes helicopter surveys in lower Cook Inlet will have negligible effects on listed Steller's eiders.

5.3 Indirect Effects

Indirect effects of the action are defined as “those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur”

(50 CFR §402.02). While the activities that may be authorized could lead to additional research in the future, they cannot be said to be reasonably expected to occur. Therefore, no indirect effects to listed eiders are anticipated to result from the proposed activities.

5.4 Interrelated and Interdependent Actions

Interdependent actions are defined as “actions having no independent utility apart for the proposed action,” while interrelated actions are defined as “actions that are part of a larger action and depend upon the larger action for their justification” (50 CFR §402.02). The Service has not identified any interdependent or interrelated actions that may result from the issuance of the proposed permit or activities authorized by it that could result in impacts to listed eiders.

Polar Bears

Polar bears occasionally use the coastal margins of the action area in summer and fall, but encounters are anticipated to be infrequent and affect few individuals, particularly for activities occurring inland. If field crews in transit via aircraft encounter polar bears, aircraft noise may cause minor behavioral changes in polar bears (e.g., may run a short distance). However, to minimize effects if field crews detect a polar bear, per the human – polar bear guidelines they will divert their flight path to a minimum of 2,000 feet above ground level or ½ mile horizontal distance away from the observed bear(s) whenever possible. There is also a slight possibility that field crews on the ground may encounter transient polar bears during the proposed action. However, any disturbance by humans on the ground would be minor and temporary behavioral changes, especially because field crews will follow a human-polar bear interaction plan. Because the chance of encountering a polar bear is low and if one is encountered affects will be minor, project effects are discountable and insignificant on polar bears.

Polar Bear Critical Habitat

Several projects take place in polar bear critical habitat. These projects will either not alter physical features of critical habitat important to the conservation role of polar bears or the alterations will be extremely limited in nature (e.g., tracts from aircraft on flat tundra). Disturbances in critical habitat are minor in scale, will not persist, and thus will not affect critical habitat’s intended conservation role for polar bears. Therefore, effects of the proposed projects are insignificant to polar bear critical habitat.

6. CUMULATIVE EFFECTS

Under the Act, cumulative effects are the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this BO. Future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation under the Act.

7. CONCLUSION

After reviewing the current status of spectacled and Steller’s eiders and polar bears, the environmental baseline, effects of the proposed activities, and cumulative effects, it is the

Service's biological opinion that the issuance of a section 10 permit to authorize the proposed activities is not likely to jeopardize the continued existence of spectacled and Steller's eiders, and polar bears and is not likely to result in destruction or adverse modification of designated critical habitat.

The regulations (51 FR 19958) that implement section 7(a)(2) of the Act define "jeopardize the continued existence of" as, "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." We have concluded that the proposed action is not likely to jeopardize the continued existence of spectacled and Steller's eiders, and polar bears or adversely modify or destroy its critical habitat.

The following information led us to the conclusion that this action, as proposed, is not likely to jeopardize the continued existence of these species:

- 1) Disturbance to breeding and nesting birds will occur, however, it will affect comparatively few individuals, and be minor in nature, and should be offset by the net benefit of the research to recovery of the species.
- 2) Disturbance to the listed population of Steller's and spectacled eiders from aerial surveys is anticipated to be transitory and will likely disturb listed eiders for a short period of time, after which they will resume normal behavior.
- 3) Disturbance to over wintering populations in Lower Cook Inlet from permitted helicopter surveys is temporary, and should not have significant energetic costs such that over winter survival is affected.
- 4) The project participants will abide by Polar Bear Interaction Guidelines (Appendix A) developed to ensure the permitted activities are conducted in a manner that avoids conflict between polar bears and humans. As a result of agreement to follow the guidelines, no adverse impacts to this species are anticipated.
- 5) Effects to critical habitat will not persist, will have at most an insignificant effect on the function of PCEs, and are unlikely to affect the intended conservation role for polar bears.

Using methods and logic explained in the *Effects of the Action* section, we estimate up to 20 spectacled eider eggs may be incidentally taken as a result of ground-based survey work. No incidental take of Steller's eiders is anticipated.

While still take, it is important to note that the loss of eggs is of much lower significance for survival and recovery of the species than the death of an adult bird. For example, spectacled eider nest success recorded on the Y-K Delta ranged from 18-73% (Grand and Flint 1997). From the nests that survived to hatch, spectacled eider duckling survival to 30-days on the Y-K Delta ranged from 25-47% (Flint et al. 2000). Over-winter survival

of one-year old spectacled eiders was estimated at 25% (Flint pers. comm.), and annual survival of 2-year old birds (that may enter the breeding population) was estimated at 80% (Grand et al. 1998). Using these data we estimate for every 100 spectacled eider eggs laid on the Y-K Delta, at most between 1 and 7 may survive and enter the breeding population. Similarly, we expect that only a small proportion of spectacled eider eggs or ducklings on the North Slope would eventually survive to maturity.

The North Slope breeding population estimate for 2007-2009 (adjusted for detection probability = 46%) was 12,506 (9,365–15,646, 90% C.I; Larned et al. 2010); hence, the estimated 20 eggs is not expected to have a significant population level effect. The Service believes this level of incidental take will not significantly affect the likelihood of survival and recovery of spectacled eiders.

8.0 INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. “Harm” is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement. In addition, because the proposed action is the issuance of permits per section 10(a)1(A) of the Act, direct take is permitted per the statute and implementing regulations.

The measures described below are non-discretionary, and must be undertaken by ABR, Inc., so that they become binding conditions of any grant or permit issued to an applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Service has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Service fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the researchers must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

As described in the *Effects of the Action* section, the activities described and assessed in this BO may adversely affect spectacled and Steller’s eiders through investigator disturbance during ground-based surveys and nest searches. The researchers may disturb up to 5 spectacled eider nests in association with nest searches and implantation of

thermistor eggs, which could result in egg loss. Estimating take of spectacled eiders from the proposed project activities is difficult, but information does exist from similar studies of spectacled eiders and other waterfowl, using similar techniques. Methods used to estimate incidental take for each of these are described in the *Effects of the Action on* section. The Service estimates 20 spectacled eider eggs may be incidentally taken as a result of ground-based survey work and <1 Steller's eider nest would be impacted due to disturbance and no loss of production is likely to result from proposed activities; thus no incidental take of Steller's eider is anticipated.

While the incidental take statement provided in this consultation satisfies the requirements of the Act, it does not constitute an exemption from the prohibitions of take of listed migratory birds under the more restrictive provisions of the Migratory Bird Treaty Act. However, the Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions specified herein.

9.0 REASONABLE AND PRUDENT MEASURES

Of the activities covered under the permit TE012155-0, only those associated with the ground-based surveys may result in incidental take. The Service believes that the following reasonable and prudent measure (RPM) is necessary and appropriate to minimize this incidental take of spectacled eiders:

1. To minimize the likelihood that nest investigation work will increase predation rates and reduce nesting and fledgling success of spectacled eiders, work shall be organized so that the minimum number of visits to a nest are performed.

10.0 TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measure described above applies. These terms and conditions are non-discretionary:

- (a) Prior to approaching nests, the surrounding area shall be visually checked for predators. If a predator is spotted in proximity (i.e., would be able to locate the nest through flushing of the hen), the nest shall not be approached. Predators, for the purposes of this term and condition, shall include fox, ravens, gulls, and jaegers.
- (b) Equipment (thermistored eggs) will be retrieved, and nest fate will be checked, only after hatch.
- (c) Eggs shall be immediately covered with down or like insulating material following completion of nest/egg examination and thermistored egg addition.

(d) A report for all activities conducted under authority of this permit must be submitted annually to the Endangered Species Coordinator, Regional Office, by December 31. The report shall include the following sections: introduction, objectives, methods, results, conclusions, and recommendation for species recovery.

The Service believes that no more than 20 spectacled eider eggs will be incidentally taken during activities permitted by TE012155. The RPM, with its implementing terms and conditions, is designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measure provided. The permittee (ABR, Inc.) must immediately provide an explanation of the causes of the take and review with the Service the need for possible modification of the reasonable and prudent measure. If Steller's or spectacled eiders are encountered injured or killed as a result of permitted activities, please contact either the Fairbanks Fish and Wildlife Field Office, Endangered Species Branch, at (907) 456-0297, or the Anchorage Fish and Wildlife Field Office, Endangered Species Branch, at (907) 271-2778, for instruction on the handling and disposal of the injured or dead bird.

11.0 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. No conservation recommendations have been developed for this project.

12.0 REINITIATION NOTICE

This concludes formal consultation on the renewal of Recovery Permit # TE012155. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the action agency that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the action is subsequently modified in a manner that causes an effect to listed or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your concern for endangered species and for your cooperation in the development of this biological opinion. If you have any comments or require additional information, please contact Neesha Stellrecht at (907) 456-0297 with the Fairbanks Fish and Wildlife Field Office, Endangered Species Branch, Fairbanks, Alaska

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Appendix A.

POLAR BEAR INTERACTION GUIDELINES

These Polar Bear Interaction Guidelines (Guidelines) were developed to ensure that activities are conducted in a manner that avoids conflicts between humans and polar bears. Polar bears are protected under the Marine Mammal Protection Act (MMPA), and were listed as a threatened species under the Endangered Species Act (ESA) in 2008. The MMPA and ESA both prohibit the “take” of polar bears without authorization. Take includes disturbance/harassment, as well as physical injury and killing of individuals.

In addition to sea ice, polar bears use marine waters and lands in northern Alaska for resting, feeding, denning, and seasonal movements. They are most likely to be encountered within 25 miles of the coastline, especially along barrier islands during July-October. Polar bears may also be encountered farther inland, especially females during the denning period (October-April). Polar bears may react differently to noise and human presence. The general methods for minimizing human-bear conflicts are to: 1) avoid detection and close encounters; 2) minimize attractants; and 3) recognize and respond appropriately to polar bear behaviors. These Guidelines provide information for avoiding conflicts with polar bears during air, land, or water-based activities.

Unusual sightings or questions/concerns can be referred to: Susanne Miller or Craig Perham, Marine Mammals Management Office (MMM Office), 1-800-362-5148; or to Sarah Conn (907) 456-0499 of the Fairbanks Fish & Wildlife Field Office (FFWFO).

When operating aircraft:

- If a polar bear(s) is encountered, divert flight path to a minimum of 2,000 feet above ground level or ½ mile horizontal distance away from observed bear(s) whenever possible.

When traveling on land or water:

- Avoid surprising a bear. Be vigilant—especially on barrier islands, in river drainages, along bluff habitat, near whale or other marine mammal carcasses, or in the vicinity of fresh tracks.
- Between October and April special care is needed to avoid disturbance of denning bears. If activities are to take place in that time period the MMM Office should be contacted to determine if any additional mitigation is required. In general, activities are not permitted within one mile of known den sites.
- Avoid carrying bear attractants (such as strongly scented snacks, fish, meat, or dog food) while away from camp; if you must carry attractants away from camp,

store foods in air-tight containers or bags to minimize odor transmission until you return them to “bear-resistant” containers.*

- If a polar bear(s) is encountered, remain calm and avoid making sudden movements. Stay downwind if possible to avoid allowing the bear to smell you. Do not approach polar bears. Allow bears to continue what they were doing before you encountered them. Slowly leave the vicinity if you see signs that you’ve been detected. Be aware that safe viewing distances will vary with each bear and individual situation. Remember that the closer you are to the animal, the more likely you are to disturb it.
- If a bear detects you, observe its behavior and react appropriately. Polar bears that stop what they are doing to turn their head or sniff the air in your direction have likely become aware of your presence. These animals may exhibit various behaviors:
 - *Curious* polar bears typically move slowly, stopping frequently to sniff the air, moving their heads around to catch a scent, or holding their heads high with ears forward. They may also stand up.
 - *A threatened or agitated* polar bear may huff, snap its jaws together, stare at you (or the object of threat) and lower its head to below shoulder level, pressing its ears back and swaying from side to side. These are signals for you to begin immediate withdrawal by backing away from the bear. If this behavior is ignored, the polar bear may charge. Threatened animals may also retreat.
 - In rare instances you may encounter a *predatory* bear. It may sneak or crawl up on an object it considers prey. It may also approach in a straight line at constant speed without exhibiting curious or threatened behavior. This behavior suggests the bear is about to attack. Standing your ground, grouping together, shouting, and waving your hands may halt the bear’s approach.
- If a polar bear approaches and you are in the bear’s path—or between a mother and her cubs—get out of the way (without running). If the animal continues to approach, stand your ground. Gather people together in a group and/or hold a jacket over your head to look bigger. Shout or make noise to discourage the approach.
- If a single polar bear attacks, defend yourself by using any deterrents available. If the attack is by a surprised female defending her cubs, remove yourself as a threat to the cubs.

When camping:

- Avoid camping or lingering in bear high-use areas such as river drainages, coastal bluffs and barrier islands.
- Store food and other attractants in “bear-resistant” containers*. Consider the use of an electric fence as additional protection. Do not allow the bear to receive food as a reward in your camp. A food-rewarded bear is likely to become a problem bear for you or someone else in the future.
- Maintain a clean camp. Plan carefully to: minimize excess food; fly unnecessary attractants out on a regular basis (i.e. garbage, animal carcasses, excess anti-freeze or petroleum products); locate latrines at least ¼ mile from camp; and wash kitchen equipment after every use.
- If a polar bear approaches you in camp, defend your space by gathering people into a large group, making noise and waving jackets or tarps. Continue to discourage the bear until it moves off. Have people watch the surrounding area in case it returns later, keeping in mind that polar bears are known to be more active at night. Additional measures to protect your camp, such as electric fences or motion sensors can be used.

Harassment of polar bears is not permissible, unless such taking (as defined under the MMPA) is imminently necessary in defense of life, and such taking is reported to FWS within 48 hours.

*Containers must be approved and certified by the Interagency Grizzly Bear Committee as “bear-resistant.” Information about certified containers can be found at <http://www.igbconline.org/html/container.html>.

FOR DEPARTMENT OF INTERIOR EMPLOYEES ONLY

Use of Deterrents

In addition to following the Guidelines above, all U.S. Fish and Wildlife Service (Service) employees must have completed the Department of the Interior’s (DOI) Bear and Firearm Safety Training course and be current in certification before engaging in field activities. Service staff must practice with and know how to use deterrents prior to conducting field work. If working in bear habitat, Service staff must anticipate and plan for possible scenarios of encountering polar bears, and identify appropriate responses, prior to initiating field work. Use of non-lethal polar bear deterrents by Service staff is only permissible if it is done in a humane manner and is for the purposes of protection or

welfare of the bear or the public. Service staff has the right to use lethal methods to protect the public from polar bears in defense of life situations, and may do so when all reasonable steps to avoid killing the bear(s) have been taken.

Notification of Use of Deterrents

The Department of the Interior Bear Incident Report Form will be used to record and report polar bear-human interactions *that require use of deterrents*. These incidents will be reported to the MMM Office. This information will be used to track interactions over time and improve polar bear conservation and management.